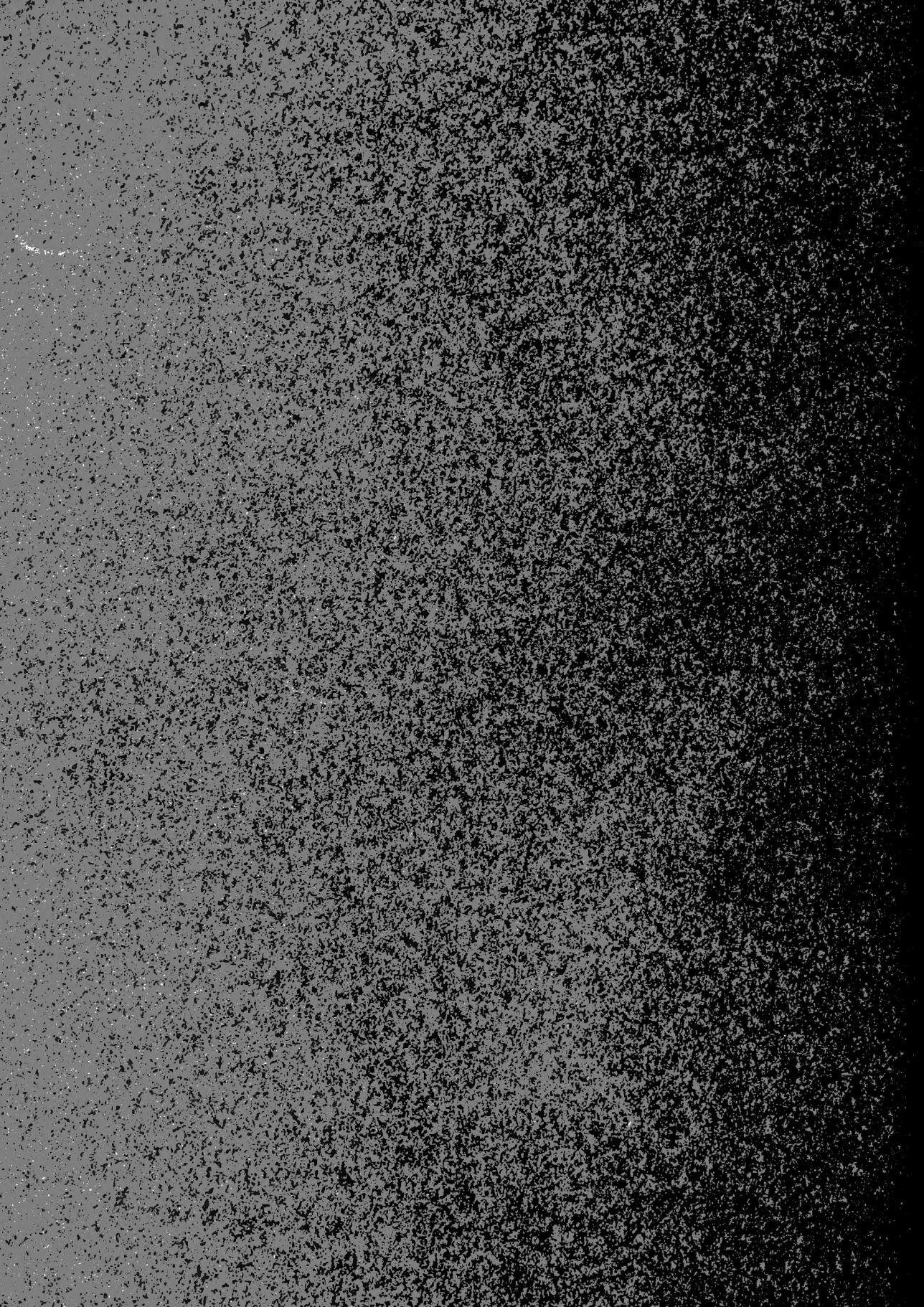

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

BRANCH OF RESEARCH

MONTHLY REPORT

OF

DENDROLOGY
FOREST EXPERIMENT STATIONS
FOREST PRODUCTS
FOREST ECONOMICS
GRAZING RESEARCH

August, 1927.

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BRANCH OF RESEARCH

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FOREWORD

(Extracts from a paper)

HOW MAY THE AMERICAN AGRICULTURAL EXPERIMENT STATIONS GAIN HIGHER STANDING AS INSTITUTIONS FOR SCIENTIFIC RESEARCH?

BY S. B. DOTEN,
Director, Nevada Agricultural Experiment Station

Today we are beginning to appreciate the value of investigation. In every state university we hear the insistent cry for more research, for more men capable of the scientific investigation of problems. Where are we to find men, how are we to train men who have a natural aptitude for research? Under all the conditions prevailing in our state universities, their peculiar type of organization and government, how are we to create and maintain an atmosphere in which genuinely free minds of high endowments and proved ability may work and grow, following research problems through years to their legitimate conclusions? In short, how are we to bring the work of the experiment stations up to the level of the world's best work and thought in science? The problem is a large one. It touches most vitally and most fundamentally the whole organization of the state university. It is a problem to be studied with the utmost earnestness. Are there not ways in which the older universities of established standing may help the newer ones toward a solution?

Few educated men are in any true sense fitted for research and investigation. Much depends upon the training of the man; far more upon the natural gifts and endowments of his mind. It is so easy to endow a college with money; it is so hard to endow it with brains. Men of intelligence, men of rare natural gifts may be attracted to an experiment station if conditions in the state university to which it is attached are favorable to a man's best development of his best self.

And what, then, are the favoring conditions which make possible in a university a high type of research? Non-interference and leadership.

Non-interference with the time, plans and work of the research men is a negative condition. Why should it be the one thing thought of first of all? It is because it is just the one condition hardest of all to obtain and hardest to maintain in the American state university. Changes in boards of control and in administrative heads; changes in buildings and equipment brought about by rapid and poorly coordinated growth; pressure for results from researches which can bear fruit only after prolonged develop-

(Over)

ment and in the course of time; a lack of popular appreciation of the outstanding value of laborious, unselfish investigation; that itching for publicity which afflicts many estimable colleges; combinations of teaching or extension or other duties ill-mated with research; vexatious and disturbing financial systems: all these things and many others break into the time and the thought of men engaged on research problems, oftentimes to the ruin of well planned work. Under such conditions many a piece of research, well conceived and promising, has dwindled like a tree planted in a cellar, until it has died at last and borne no fruit. Sometimes, too, the pressure for immediate results has led to shallow popular work, or to a jumping at conclusions akin to quackery. Sometimes legislatures have been led to make great appropriations to such work because of its popular and flashy character; and their money has been wasted, their confidence impaired. Even in hurried America there is no way in which we can force the tree of knowledge to bear and ripen its fruit before its due season.

Another important set of conditions allied to the first is that supplied by the type of supervision and direction in vogue. In any research institution the only form of administration or direction which can be successful is the type implied in the word "leadership." Above all other things, research, scientific investigation, is a product of the individual mind, or of a group of minds working on related aspects of the same problem. Research is original, original in means and method and in the end sought. If it is not original, then it is not research. No man can tell in advance what are to be his methods and what his results. If he can tell, then his work is not investigation at all but demonstration, a retracing of the path found by other minds.

The whole trend of thought in college and station work in America indicates that the greatest responsibility of the leaders in administration, their duty and their pleasure, must be to attract and to hold strong, independent minds free in thought and fearless in character; and then, wholly subordinating the machinery of administration to the ends sought, to lead those minds into the best and highest and most original service of which they are capable. Good administration, like good literary style, sinks itself and loses sight of itself in the things said and in the work and thought.

In its relation to the whole university as a division or department of the larger whole it is evident that genuine research in the experiment station can progress only where the atmosphere is just, thoughtful, conservative and in accord with the best traditions of university life and thought.

Why may not the great universities regard the experiment stations as graduate schools? That is what they soon come to mean to the men who do research in them under happy auspices. When the at-

mosphere of the university is favorable to research, when men are recognized and honored by their colleagues and by the administration because of the high character of research papers which they have published, then the experiment station becomes a school, a higher university for the members of the station staff. In many a university the young man working for his doctor's degree in regular course is not enough alone; he is not forced to draw heavily enough upon his own mental resources; to an extent hardly recognized he may actually develop not his own ideas and lines of thought but those of the teacher whose mind overshadows him. A research problem in an experiment station is a better test of what the man really knows and can do toward the development of that new knowledge which is advancement. In the experiment station the research worker must block out his own road into the unknown.

I hope the time may come when the larger and older universities will be glad to place students of exceptional power and maturity and promise in the experiment stations to work upon special problems allied to agriculture in preparation for the doctor's degree. The station should furnish books, laboratory equipment, money enough to enable the aspiring research student to live in relative comfort. But above all it should supply an atmosphere which would welcome and stimulate and encourage the keenest thought and the bravest effort. Upon the completion of the work to a definite stage, it should be published as the station's contribution to knowledge in that field and as the thesis of the candidate for the doctorate. The completion of successful work giving evidence of genuine ability would almost inevitably lead to the employment of the man somewhere in experiment station work. Thus the stations would enrich themselves by adding to their workers young men of demonstrated ability, of high ambition and marked promise and of preparation under the most favorable conditions.

(From Proceedings of the 28th Annual Convention of the Association of American Agricultural Colleges and experiment stations, held November 1914.)

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FOREST EXPERIMENT STATIONS

Washington

General

During August Mr. Munns visited the Stations in Districts 1 and 6, and plans to visit Districts 5, 4, and 2 before returning to Washington. Mr. Clapp left during the latter part of the month for a swing around the western Districts and Stations. Eyre spent

about three weeks at the Northeastern Station, returning to Washington the latter part of the month. He worked with Westveld's party for about ten days on remeasurement of permanent plots at Corbin Park, N. H. and at Waterville. He also visited the Cherry Mountain methods of cutting and brush disposal plots and the Harvard and Yale Forests.

The Washington office remains the headquarters for the Allegheny Station, no decision as to headquarters location having yet been made by the Secretary.

Among the visitors were Mr. Wyman, who spent several days in the office in connection with Southern Station matters, and Mr. McCarthy, who was called in for conferences on the flood control study.

Mr. Haig wound up his work on the western yellow pine yield study and left the last of the month for a short vacation before taking up his studies for the next year at Yale. After spending three weeks at the Southwestern Forest Experiment Station Mr. Reineke is now at the California Station on a 6 weeks' detail, and Mr. Bruce, who returned to the office for the month of August, is again on leave of absence for the next three months.

Photographs

Mr. Sudworth's collection of photographs, over 900 in all, have been carefully gone over and placed in the Service collection. These pictures were taken mostly from specimens of foliage and fruit collected by Mr. Sudworth to be used in his publications.

Library

There were 863 books and periodicals borrowed from the library in August, and 123 members of the Service and others consulted the library in person.

During the month the librarian indexed 159 books and periodical articles for the catalogue.

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NORTHEASTERN FOREST EXPERIMENT STATION

Westveld spent the early part of the month on methods of cutting and brush disposal studies on the Corbin Park, Waterville, and Cherry Mountain plots in New Hampshire. Mr. Marsh of the Washington office joined him for a short field trip, while Mr. Eyre, also of the Washington office, joined the party for two weeks' field work after a brief visit to the station headquarters and Harvard Forest.

Westveld, Gast and Stickel attended the soil conference at Harvard Forest under the direction of Doctor Hesselman, director of the Swedish Forest Experiment Station. This conference was both interesting and instructive. The chief point brought out by the examination of the forest soils on the Harvard Forest is that well-developed and pronounced podsol soil, as frequently found in old field white pine stands, can within a comparatively short time be changed to good mull soil when such pine stands are cut and replaced by natural stands of hardwood, particularly when chiefly composed of white ash, sugar maple, and white birch. A comparison of soils on former pure white pine stands cut about twenty years ago which have come up largely to hardwoods of the better species, with the soil now existing under the remnants of these original white pine stands, showed that this transformation can be completed within fifteen to twenty years. Westveld and Gast accompanied Doctor Hesselman to Keene, Newport, Laconia, Campton, Twin Mountain and Berlin, New Hampshire, making soil tests and examination at various places. They were joined at Twin Mountain by Mr. Dana and Mr. Heiberg, the latter being engaged in sample plot work in Vermont, under Westveld's general supervision.

Stickel gave a short course of lectures in ecology to the Massachusetts Agricultural College summer school during the first two weeks of the month, while the remainder of the month was devoted to his regular fire weather study and the soil conference at Harvard Forest.

Spaulding spent the first part of the month on the slash rotting investigation, while the rest of the month was spent on the European larch canker which has been recently discovered in Eastern Massachusetts on plantations of imported trees of European larch.

MacAloney, who has been on furlough from the Bureau of Entomology during the summer, returned to the station the latter part of the month. During June, July, and August he was in New Brunswick and Nova Scotia coordinating the work on the white pine weevil which is being carried on by the Dominion Entomological Branch with the work in the New England States, and in assisting in the experiments being conducted by the Entomological Branch in the control of spruce bud work by airplane dusting.

Hall left at the end of the month for Ann Arbor, Michigan, where he will work for his doctor's degree during the coming year at the School of Forestry and Conservation at the University of Michigan.

The computation work on the fire statistics study has been practically completed, and the report will be prepared by Mr. Dana during the early fall.

Mr. Dana left the last of the month to take up his new duties in the School of Forestry and Conservation at the University of Michigan.

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CENTRAL STATES FOREST EXPERIMENT STATION

General

During the month the Forester approved the adoption of the name, Central States Forest Experiment Station, for this Station. We are glad to have this shorter name in preference to the one originally used.

Dr. Bernard F. Myer has been appointed Associate Forest Ecologist and will report to this Station on September 15. We were fortunate in having secured the temporary appointment of Miss Virginia Eader to assist us in preparation of the flood study report. We are also fortunated in being able to secure the services, on a temporary basis, of F. Gilbert Hills, a graduate of the University of Maine Forest School.

Flood Study

The flood study has occupied the attention of practically the entire staff of the Station during the month. In addition to the staff of this Station, O. M. Wood was assigned by the Allegheny Station to work up the report on the Allegheny and Monongahela watersheds. L. R. Smith was furnished by District 7 to investigate and report on several drainages in Kentucky. V. H. Cahalane of the Pisgah National Forest spent several days assembling material for the report on the French Borad drainage. In addition to this we were very materially assisted by reports prepared by some of the State Foresters. Early in the month we received reports from State Forester Merrill of Kentucky, Maddox of Tennessee, Telford of the Natural History Survey of Illinois and later in the month received a detailed report from Jones of Virginia.

In addition to this, visits were made to several states by members of the staff. McCarthy and Bower met Smith in Lexington, Kentucky, and interviewed Acting Director Roberts of the Kentucky Experiment Station at Lexington. Bower was left with Smith to examine further the watersheds of Kentucky. McCarthy then stopped in Frankfort, Kentucky, to see the State Geologist, W. R. Jillson and State Forester Merrill and went from there to Nashville, Tennessee. State Forester Maddox was unfortunately absent from his office at the time of this visit. The office of the Cherokee National Forest was visited by McCarthy on his return trip to Columbus.

Hanley left Columbus on August 9 for a brief trip over the Wabash Valley basin. He was accompanied by Prof. Burr N. Prentice of Purdue University and interviewed Chas. C. Deam, former State Forester of Indiana, and also officers in the Division of Engineering and Division of Forestry at Indianapolis. He then traveled through the southern portion of Illinois and returned through southern Indiana to Columbus. Norman W. Scherer, who has been temporarily assisting us in the Station work, spent four days in the Big Sandy drainage in examining it before preparing a report on this drainage area. During the month Wood, Smith, Sims and Hursh were at the Station headquarters preparing reports on the portions of the study assigned to them. Hursh prepared the report on the geology and soils of the entire Ohio basin. We feel that he has done this very effectively considering the time allotted to him. The geology and soils maps which he prepared are being reproduced in Washington and will become a part of the report.

Oak Study

Arrangements were made with the Allegheny Station during the latter part of the month for the assignment of O. M. Wood to the oak study. He will be assisted by Morey who has been with the field party of the Appalachian Station during the greater part of the summer. They plan to extend the oak yield study into Pennsylvania. Hanley, Bower and Hills spent several days during the latter part of the month on this work in southeastern Ohio.

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LAKE STATES FOREST EXPERIMENT STATION

The outstanding activity of the Station during July and August was the preparation of the Flood Control Report for the Upper Mississippi Watershed. This involved the critical review of forest and soil conditions of the States of Minnesota, Wisconsin, and Illinois and large parts of Iowa, Missouri, Indiana, and South Dakota. The meager information available on forest conditions in the prairie States and the absence of mountains made a critical evaluation of the forest, from the standpoint of streamflow, very difficult. Although the work took nearly two month's time of five men, it was worth while. It changed very materially our conception of where the most critical forests in the region lie.

The Flood Control Report disarranged all field work of the Station except that at the Upper Peninsula branch station. There the newly appointed Junior Forester, E. L. Mowat, with Field Assistant W. W. Chase, worked uninterruptedly on the survey of the cut-over half section and the completion of the permanent sample plots.

Another event of significance was the visit of the foreign delegates of the International Congress of Soil Science on July 23 and the special trip made by Prof. H. Hesselman to the Minnesota National Forest and the Upper Peninsula branch station. The lack of time of the delegates prevented an extended trip to the woods, but about ten of them were taken out to see some forests and plantations near St. Paul. The forests around St. Paul are similar to forests found in Europe in the transition zone between true forests and prairie. There they are called pre-prairie (Vorsteppen).

Professor Hesselman's theory of the value of fire in the Swedish forests in destroying the raw humus was found inapplicable to the forests of the region. He did not find anywhere raw humus, and the thinness of the layer of leaf litter and the loose mellow character of the humus layer distinctly indicated favorable nitrification conditions. The frequent fires were not responsible for the favorable soil conditions, as no raw humus was found in virgin stands which were not burned for decades. The lack of raw humus, therefore, must be explained by the climatic and soil conditions of the region, and fire, unlike in Swedish forests, is not needed here to improve soil conditions. The theory of the beneficial effects of fires on soils and natural reproduction received, therefore, another blow.

A point on which we desired the special advice of Professor Hesselman was in relation to our swamp forests and their drainage. He found a marked similarity between the swamp forests of Minnesota and Sweden. The experimental swamp drainage area on the Minnesota National Forest belongs to the type of high peat swamps in Sweden which, according to the experience of Swedish foresters and engineers, is very difficult to convert into a good forest. The experimental swamp at Ruse, on the other hand, he found to be most susceptible to a rapid response to drainage. This is the type of swamps which is most successfully being drained in Sweden. At both places he thought that our ditches were not deep enough and our drainage not sufficiently radical. In the light of the too deep drainage of the past our caution in starting first with shallow drainage and studying its effect seems to us still justifiable.

A third event that may be productive of interesting results in the region is the passage of a law in Wisconsin, creating a non-political Conservation Commission and modifying present taxation. Both have stimulated the interest of the private owners to an extent greater than in the other two States. The Commission is made up of high grade men, earnest, sensitive of their great responsibility. A meeting, held at Green Bay on August 23, sponsored by the lumbermen and the pulp and paper industry, at which the Commission was present, was devoted to the discussion of forest problems, especially selective logging, -- the first discussion of the kind that has taken place in the Lake States region. Four or five for-

esters were on the program, among whom was Zon who talked on "Is Selective Logging Practicable?" One of the outcomes of the meeting was the creation of a committee, consisting of representatives from the Northern Hemlock and Hardwood Manufacturers Association, the pulp and paper industry, the Forest Products Laboratory, and the Lake States Experiment Station, to work with the newly created Conservation Commission in preparing a forest program for the State. The first meeting is scheduled for September 2 at Milwaukee.

The Agricultural College of the University of Wisconsin is also awakening to the new opportunities and Dean Russell is very much interested after his recent visit, in company with Dean Coffey and Zon, to the Cloquet Experiment Station and the Minnesota National Forest in starting some forest work. Plans are in the air for the establishment of a branch forest experiment station in Wisconsin. Our Station also was instrumental in outlining a short course to be given by the University of Wisconsin to woods bosses and foremen and forest rangers.

The manuscript on Selective Logging, with Special Reference to the Cost of Logging Small and Large Trees, is going through the usual tribulations of all manuscripts in the Forest Service. While selective logging has already become a living force among the lumbermen of the region, the Editor of the Laboratory is still debating whether it is a safe publication to give out to the world. From the present outlook, the manuscript has a long, hard road ahead of it. As the need for information, however, is persistent, a preliminary statement, including most of the important tables, has been prepared for publication by the Northern Hemlock and Hardwood Manufacturers Association.

The personnel of the Station has been nearly 50 per cent renovated. We have two new Junior Foresters, James L. Averell and Edwin L. Mowat, to replace Wackerman and Brown. S. R. Gevorkiantz, who served the Station faithfully and effectively for nearly two and one-half years as Scientific Aid and Field Assistant, has received his permanent appointment as Junior Forester but has been granted leave of absence for nine and one-half months to attend Harvard University, where he received a scholarship.

Mitchell's bulletin, "Forest Fires in Minnesota," is in final shape for publication and the station hopes to publish it as a State bulletin within the next three months.

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APPALACHIAN FOREST EXPERIMENT STATION

General

Field work on the regular projects was carried on actively during August in spite of temporary reductions in the Station's staff. Hursh spent the entire month and Sims the first ten days of August at the Central States Station, assisting McCarthy in his report on the relation of forests to flood control in the Mississippi and Ohio River drainages. Hursh's contribution to this study was a report on the soils and geology of the Ohio River basin. As approximately one-third of the Ohio River basin lies within the territory of the Appalachian Station, the information thus compiled will be of practical use to this Station. It is therefore planned to utilize the preliminary maps prepared by Hursh in an extension of this survey to cover the soils and geology of the entire territory of the Station.

Methods of Cutting - Mountain Hardwoods

The field party consisting of J. H. Buell and temporary assistants Roe, Downey, Scholz, Morey, and Bradshaw, which is studying natural reproduction on cut-over areas in the mountains of Tennessee and Virginia, spent the first three weeks of August in the Damascus district of the Unaka National Forest. Suitable areas for the study in the Glenwood district of the Natural Bridge National Forest were located by Frothingham and Buell with the cooperation of Ranger C. R. Carr and of Ranger E. M. Manchester of the Unaka National Forest. Frothingham then joined Sims on the Shenandoah National Forest, where additional working points were found at Camp Todd, Hone Quarry Run, and Liberty Furnace. At the end of August the field party had begun work at Camp Todd. Some 1200 acres were examined during the month. The reproduction and hold-over trees were measured on 128 half-acre sample plots, representative of the different sorts of cutting in various forest types.

Chestnut was present to a greater or less extent on all the areas that were studied. Without exception this species was found to be infected with blight, and everywhere operations are being made to salvage the wood that was left by the older sawtimber cuttings, or has grown as sprouts following them. The largest proportion of it is going into acidwood, although poles are being taken out in the better stands. Such salvaging operations are going on on a large scale in the vicinity of Damascus and Buena Vista, Va., where tanning extract plants are located.

An interesting condition was noted in the flat valley of the North River in the vicinity of Camp Todd on the Shenandoah National Forest. Here white pine and hemlock in considerable

quantities are taking the place of chestnut oak, white oak and red oak which was cut 18 to 20 years ago. This reproduction was already on the ground at the time of the cutting and has made excellent growth since then. Borings made on a number of these trees showed the diameter growth made during the 10 years following the cutting to be as much as two and one-half times that made in a similar period previous to it.

Haasis, who was kept from active field work by an operation for appendicitis, spent the last half of August on records and maps of the Berea sample plots.

Chestnut Replacement Study

Field work on the study of the nature and extent of replacement of blight-killed chestnut by other species was continued on the Bent Creek Experimental Forest near Asheville by Junior Forester MacKinney and Field Assistants Nothstein and Ziegler. Three plots - two of one acre and one of one-half acre - were laid out, two of them on north facing slopes and the other in a cove. These plots were subjected to a heavy cutting in addition to the regular chestnut salvage cutting. Only well shaped trees of desirable species were left as seed trees on these plots. The marking was participated in by Mr. John L. Cobbs, Jr., in charge of Public Relations for the A.C.L. Railroad Company, and C. F. Korstian of this Station.

In addition to their immediate purpose for the chestnut replacement study, these plots will furnish data for the study of natural reproduction following different cutting methods. From this point of view they should also throw light upon the problem of the treatment of a considerable part of the experimental forest. The records of trees, stumps, and reproduction made on these plots conform to those commonly taken on permanent sample plots in the methods of cutting and similar studies. Crown projection maps have been prepared. Milacre plots (6.6 feet square) have also been established in order to observe the progress of reproduction on the plots.

In addition to the larger plots, forty square rod plots were established around chestnut stumps not only to study the replacement of the chestnut by other species, but also to determine the extent to which the repeated sprouting of the chestnut will retard replacement. Ten of the square rod plots were treated by each of the following methods:

1. All sprouts removed except largest sprout.
2. Stump peeled to prevent sprouting.
3. Stump treated with sodium arsenite to prevent sprouting.
4. All sprouts left intact as controls.

Widespread Death of Oaks Attributed to Insects

During the past summer a large number of oaks, largely scarlet oaks, throughout the Southern Appalachian district have been dying. The cause is uncertain and probably a combination of conditions is responsible. Most of the trees affected are mature and somewhat slow growing. All those examined have contained more or less evidence of recurring attacks by Prionoxystus robiniae and a great deal of damage has been done both to the limbs and trunks. In all cases a species of Agrilus was found working under the bark and this work often completely surrounded the trunk from the base to the crown.

It seems probable that this may be an aftermath of the severe drought in this region two years ago. Oaks weakened by the drought were probably given a further set back by a very severe late frost this year (April 23rd) and succumbed finally to Agrilus attack.

Anisota senatoria is again very prevalent in the neighborhood of Asheville, N. C. A number of oaks are being defoliated. This was expected after the strong flight of moths observed late in June.

Spread of the Chestnut Blight

R. M. Nelson, forest pathologist at the Appalachian Station, made observations on the spread of the chestnut blight which show that the infection is increasing in western North Carolina and northern Georgia.

In North Carolina, the group of counties in the extreme southwestern part of the state, and the tier of counties further to the northeast and bordering on the state line, are above the ten to thirty per cent class. This is a considerable increase over the amount of blight found last year. In five northern counties of Georgia, there has also been a heavy increase of blight during the past year. These counties are now in the thirty to eighty per cent class. In a sample plot laid out in Fannin County, Ga., thirty-three per cent of the trees were blighted in 1925. This same plot now shows one hundred per cent infection. Many of the trees are half dead, and a few trees are entirely dead. This increase of sixty-seven per cent in two years, although perhaps unusual, indicates the rapidity with which the blight is capable of increasing.

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General

At headquarters the flood study occupied the attention of everybody to the exclusion of everything else except the minimum of routine absolutely essential to keep the Station going. The required maps showing forest conditions and critical areas within the Red River and Lower Mississippi drainages, together with a number of supplementary maps, charts, and graphs, were sent to Washington about the middle of the month, and the last of the major tributary reports left New Orleans on the 27th. A nine-page bibliography and a number of supplementary notes followed before the end of the month. The flood study has been of immense value to all of us who assisted in it, turning our attention to the hardwood types generally left in the background because of the more urgent problems affecting the pines, and forcing us to make a systematic analysis of forest, soil, physiographic, climatic, and economic conditions over a vast area we had barely touched upon before.

Field Assistant George Hoffman completed his assignment at the Starke Branch, returning to continue his work at the Cornell Forest School. Miss Elizabeth Owen joined the staff at Starke in the middle of the month to do the stenographic and clerical work, her presence filling a long-felt want.

At the Choctawhatchee Branch Gemmer revised his working plan for local investigations and made out work schedules to coordinate the efforts of the force on the National Forest with those of the Station.

Protection, Fire

Barrett spent the last four days of the month at Urania, where he burned two of the fire plots.

Wyman spoke on the subject of fire prevention at the Y. M. C. A. Camp near Keystone Heights. On the last of the month he also attended a meeting at Waycross, Ga., at which there was held a demonstration of machinery suitable for making fire lines. Addresses were made by Major R. E. Benedict, Captain I. F. Eldredge, and Mr. A. K. Sessoms. The meeting was attended by operators and other interested people to the number of several hundred. The combination of machines preferred for fire line construction seemed to be the Fordson tractor with a 32 inch "Tom Huston" side disk plow; this rig travelled one and one-half miles per hour over stumpy cut-over land.

Management

At the Choctawhatchee Branch Gemmer started the establishment reports on the new natural reproduction plots laid out at Camp Pinchot last spring, devoting considerable time to an analysis of the cone counts.

At McNeill, Miss., Prof. Hayes, who is working with us between the summer camp and the opening of the fall session of the Louisiana State University Forest School, took cores and cone counts from a large number of selected trees in the Pa-1 (grazing) pasture, and completed tree descriptions, to supplement the natural reproduction study which is necessarily combined with the Pa-1 study. The latter part of the month he spent in New Orleans counting cores preliminary to an analysis of the relations between age of trees, date of cutting, amount of release, and present ability to produce seed.

Wyman spent the period from August 19 to 30 in Washington, and while there helped Forbes with his bulletin on timber growing and logging practice in the southern pine region.

Naval Stores

The month's work at Starke included the routine chipping, together with the fourth dip of the season at Sampson Lake and Kingsley Lake. The Powell Tract, which has not run as well as the others, was dipped for the third time. The daily weighings and the weather records were taken as usual.

While in Washington Wyman discussed with Bruce the proper methods of working up and correlating the figures obtained in the daily weighing of gum and the recording of climatic factors.

Forestation

At Camp Pinchot Gemmer finished a review of the plantings made on the Florida National Forest since 1911, and also finished reports on the planting and the direct sowing done at Camp Pinchot last February.

While at Urania, Barrett collected cones of the hybrid, Pinus sondereggeri, for the Eddy Tree Breeding Station at Placerville, California.

Protection, Others

Grazing. At McNeill Prof. Hayes finished mapping the seed trees around the grazing experiment quadrats, a job begun more than a year and a half ago and interrupted time and again by other work. While there he found hogs in the grazing experiment pasture and considerable hog damage to longleaf seedlings on and near several of the quadrats. This will necessitate extra work this fall, to check up on the exact amount of the injury before new germination takes place, and to stop the breaks in the fence.

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CALIFORNIA FOREST EXPERIMENT STATION

General

The semi-annual meeting of the National Lumber Manufacturers' Association at San Francisco, while largely devoted to the subject of trade extension, gave some consideration to forestry questions. Mr. David Mason read a paper dealing with sustained yield as a factor in stabilizing markets. Resolutions were passed on the public and private responsibility for reforestation needs for additional forest protection and forest tax reforms, endorsing the McSweeney Bill, and the Forest Service sales policy. Leopold, Bates, and many Forest officers from California attended the meeting.

Dunning attended a conference with the members of the Office of Blister Rust, which considered their plans for next year's work and the ways in which the Station could cooperate.

Dunning accompanied John Miller and H. L. Person of the Bureau of Entomology to the Modoc for the purpose of selecting a plot where further studies on the relation of growth characteristics and resistance to western pine beetle attack could be made. One plot of 80 acres has already been established on the Sierra which has furnished promising leads between growth characteristics of western yellow pine and susceptibility to attacks of western pine beetles.

In cooperation with the School of Forestry a twenty acre native woody shrub arboretum will be established on the Campus. The Station will furnish the material.

Bates and Kotok visited the Eddy Tree Breeding Station at Placerville, where some interesting work in genetics is under way. Of particular interest are the pollination work in the conifers. So far successful sets have been made in the pines. In addition to the projeny tests and pollination with conifers, studies following Burbank's work with walnuts is being conducted at the State Forestry Nursery.

Walter Lowdermilk entered the University for his doctorate degree in Forestry. His thesis will deal with forest cover types as a factor in erosion.

Management

Three plots were selected in an even-aged 65-year old stand of white fir, Site III, for carrying out a proposed mensuration and thinning study. The plots are about one-half acre in size; one was thinned lightly, one heavily, and the third left intact for control. The control plot will supplement our data on permanent yield plots for one of the important species. Thinning has all been completed

The annual reproduction counts in the permanent sample plots on the Lassen, Plumas, and Stanislaus were completed.

One new permanent plot was established in the optimum mixed conifer type near our center of work at Strawberry. Data on losses to reproduction and seed trees were secured by the Office of Management. The life history of Ribes will also be followed on this area by the Office of Blister Rust Control.

Cover Type

Two parties are still engaged in mapping the cover types on areas outside of the National Forest. The Sequoia National Park will furnish us the cover type data for the Park. Wieslander spent a week with their forester in getting the project started.

Southern California

The vegetative succession plots are now being established on the Barranca Burn. The City of San Bernardino has agreed to build the necessary dam at the mouth of the area.

Progress has been made in enlisting the various counties in the South to set aside a regular annual appropriation for the work of the Station. Three counties have already entered into cooperative agreements and it is hoped that three more will enter the fold this year.

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The fires on the Columbia National Forest have been the overshadowing event of the month and have absorbed much of the energy and time of half the Station staff. At the time that a hundred or so lightning fires broke out on this Forest, McArdle, Isaac, Simson, and their respective field assistants were there. All turned out to help extinguish these fires in their incipiency. Many of the lightning strikes were in the 25 year old Yacolt burn which is bristling with dry snags; result, a 50,000 acre fire which it has been impossible to put out, and could hardly be checked even in favorable weather. For a time it threatened all the plot work in the Wind River Valley and lawn sprinklers have for three weeks been a fixture on the roofs of all buildings there. So to help avoid a greater catastrophe and save as much of the valley intact as possible, research has had to be subordinated for the time being. However, this experience has given the fire studies men an intimate contact with fire at its worst, and should be fruitful of lessons; fortunately, none of the important current observations have been omitted.

Munger spent about a week with Mr. C. G. Bates, partly at Wind River where the fire compelled most of their attention and partly on the Deschutes Forest with Westveld putting in a Methods of Cutting plot. The next two weeks Mr. Munns was here and he and Munger had successively a little time with Meyer on the application of yield table study, with Isaac on the lower Columbia River reproduction plots, with Westveld in the Portland office, and with McArdle, Simson, and Isaac at Wind River, on all phases of the work there.

Cooperation was arranged with the Dupont Powder people to try out some new methods of blowing down snags; the holes were bored with an auger made for the purpose but the fire situation got so bad that none were blasted.

With R. H. Chapler, the Director had a conference with Mr. McPherson of the Oregon State Board of Forestry regarding the proposed cooperative type map and inventory of timber resources.

During August an area of approximately 3,500 acres covered chiefly by second growth Douglas fir was surveyed and estimated by Meyer's crew in conjunction with a party from the Office of Management of the D-6 office, for the purpose of determining principles for the field application of yield tables. The age classes encountered ranged from the 60 year age class to the 130 year age class, with the mature stands above these. The sites ranged from a good site II to the very poorest of sites, an indication in itself that over large areas, one or two site classes cannot be expected to prevail; in other words, regional average sites will be of little use. A change of site from one quality class to another

is easily recognized in the field, since each quality class represents a difference of 30 feet in the height of the dominants and codominants at 100 years of age. Age classes however are not so easily seen. A constant use of the borer is almost necessary. A third man in an estimating party is therefore a valuable adjunct after the work becomes properly organized. Such a three-man crew can cover a mile and a half of strip a day. Site quality classes representing each a range of three site index classes have been used on this job since the adoption of the latter would have added altogether too find a subdivision of the area; even as it was conditions were much too variable for comfort. For pure prediction in respect to total stand values such as basal area, number of trees, cubic foot volumes, where the curves are constructed by pure anamorphosis, it is immaterial whether the site be stated exactly. If the volume is computed correctly, the same prediction in total cubic foot volume, omitting for the present growth to normality, will be obtained whether the curve for one site or another be used. This does not hold true of course for board foot volume, or for partial stand values or other forms of secondary derived curves. No effort will be made to start the computations until the coming winter. Then will the most interesting results technically come to light.

Westveld's second examination of the slash disposal plots on the Deschutes Forest indicates that the survival of subsequent seedlings on the plot on which the slash was left is higher than on the piled and burned plot. Both plots show a heavy loss of advance reproduction, mostly due to chipmunks. Many of the seedlings were girdled at the ground while a few of them were bitten off at the ground. In the absence of moisture in any form during the summer the chipmunks apparently are after the juicy cambium of the seedlings.

After the fires subsided on the Columbia, McArdle resumed work on Doublas fir slash disposal study by establishing several plots on the Polson Timber sale on the Olympic Forest.

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NORTHERN ROCKY MOUNTAIN FOREST EXPERIMENT STATION

Almost an inch of rain the last day of August has ended the dangerous part of the 1927 fire season without any of the research staff being called on for fire duty. This has been most fortunate because with our reduced personnel, both Haig and Kempff being absent, the diversion of the efforts of a single man would have reduced by an exceptionally large percentage the amount of research work accomplished. The almost fireless season has prevented any research work on going fires, however.

Munns arrived in Missoula early in the month, and after two days here, partly on Mississippi flood control and partly on fire studies, left for about ten days at the Priest River branch station. There the various projects, including the demonstration forest and its improvements, were gone over in detail with Weidman, Gisborne, and Marshall.

The Hoskins portable pyrometer, purchased principally for studying the temperatures of various types of forest fires and their effects on tree seeds, arrived during the month and has been given four tests on inflammability experiments as a part of other fire studies. Other stations may be interested in knowing some details of this instrument which, with four-point switch and four couples, cost only $127 delivered. The instrument itself is the high resistance type HA, measures 6"x6½"x3" and weighs about 6 pounds. The temperature range is up to 1100° centrigrade by 10-degree divisions. The scale also can be read in millivolts and no battery is required. The present couples are chromel-alumel, fire-clay sleeve insulated, one being six feet long and three being three feet long. Each of these is connected by a 25-foot chromel-alumel lead, asbestos insulated, to the four-point panel switchboard, which in turn is connected to the pyrometer by 18-inch lead-in wires. A thermometer on the face of the pyrometer indicates the cold end temperature and an adjustment screw provides for setting the needles of the instrument to agree with this. The entire set-up could be easily carried to going fires or to distant plots by one man.

As a result of the four tests so far made a few important facts have been brought out. The first is that within a 10"x10" x6" pile of burning sticks temperatures differing by as much as 90° C. occur within a distance of only one inch. In other words, when the couple was moved one inch, or when a second couple was inserted one inch from the first, a temperature higher by 90° C. was encountered. Under such conditions there hardly seems to be any justification for an instrumental sensitivity and accuracy finer than to the nearest 10° C.

Other points of interest indicated but not necessarily proven as yet are: An agreement with Dr. Hawley's statement that the ignition temperature of wood is at about 280° C. The highest temperature so far obtained in the hottest spot of an actively burning pile of branchwood was 805° C. A further interesting fact is that with this type of fuel, one to two-inch branchwood, at about 25% moisture content, temporary ignition may be caused but combustion ceases after a few minutes when the pieces are piled crib fashion a distance apart in each tier equal to the diameter of the pieces. A mere change in the arrangement of the pieces, however, may then be made to cause combustion to continue, if the pieces are simply moved closer to each other. In other words,

arrangement alone may be the factor, with these fuels and moisture contents, which will permit or prevent combustion. If this is true, then one fundamental reason for the close and compact piling of brush is apparent. The closer the surfaces of the pieces in a brush pile, the easier and the more completely the pile can be burned at high moisture content when there is least danger of spread of fire through the duff or through scattered debris.

The middle of August marked the end of two months of concentrated work on the reproduction study by Marshall, Larsen, Hatch and Averell. Their efforts resulted in the establishment of 247 sets of twin screened and unscreened quadrats on seven different areas for the purpose of comparing reproduction where seed-tree dissemination is present and where it is eliminated. The latter part of August was devoted largely to the establishment of a permanent Mc sample plot on an Idaho State timber sale. This sale, typical of the usual State practice, differs considerably from the National Forest sales and should furnish an interesting link in the chain of evidence we are trying to build up to determine the best silvicultural practice for the white pine type.

The present damp summer, which has furnished such a fireless relief to the administrative organization, has really had an even greater significance in its effect on the establishment of reproduction on last summer's burns. Foresters of the twenty-first century will little care whether 1927 was or was not an easy fire year, but they may bless the favorable conjunction of a good seed year and a wet summer which followed the great 1926 fires and thus made possible the establishment of an excellent stand.

That last summer's burns exhibit a sensational number of seedlings per acre may be shown by the data which have been worked up for a sample plot in the 60,000-acre Granite Creek burn. Based on 62 milacre quadrats, the following number of seedlings per acre was found:

White Pine	11,500
Larch	11,000
Engelmann Spruce	10,000
White fir	6,000
Douglas fir	500
Red cedar	329,000
Hemlock	207,000
Total	575,000

An extensive examination of many thousands of acres in last year's burns indicates that these figures, while well above the average, are by no means extreme.

These same quadrats indicated strikingly the superiority for white pine germination of soil surfaces in which the duff was totally destroyed. The following figures give the average number of white pine seedlings per acre found on different surfaces.

Mineral soil	18,000
Scorched humus (duff alone destroyed)	14,000
Ashes (chiefly of wood)	12,000
Charcoal	10,500
Scorched duff(very light surface fire only)	10,000
Decayed wood (unburned)	6,000
Unburned duff (small patches escaping fire)	3,500
All surfaces	11,500

C. G. Bates was a brief visitor at the Station during the month. He spent one day in the office with Weidman, one day in the field with Marshall, and one with Gisborne studying possible ways in which the Biological Section might help in the reproduction, methods-of-cutting, and fire projects of the Northern Rocky Mountain region. Our principal needs are for a satisfactory instrument to measure total daily sunlight on our quadrats, for a better system of soil measurements, for help in seed testing, and for better methods of measuring fuel moisture contents. Bates' visit gave us stimulation and encouragement for all these problems.

One of the briefest yet most notable visits ever paid to this Experiment Station was that by Senator William E. Borah, W. D. Humiston of the Potlatch Lumber Company, Ben Bush (Idaho State Forester) and District Forester Fred Morrell on August 19, when the party arrived just in time for lunch and left immediately afterward. We doubted whether the Senator saw enough or ate enough to impress himself with the existence and importance of this Station. Mr. Morrell assured us later, however, that even without his help, Messrs. Humiston and Bush informed the Senator in considerable detail and with surprising accuracy of the extent and value of the research work being done in this region. As the party was attempting to cover both state and Federal forest work in the Kaniksu region all in one day, there was no time for detailed exhibitions of any kind.

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SOUTHWESTERN FOREST EXPERIMENT STATION

The District Three Supervisor's Training Camp occupied the center of the stage during the last half of the month. As in the Ranger Training Camps of former years the growth and reproduction sample plots at the Station were made the subject of careful observation. One day was devoted to thinning studies. A plot was thinned and the measurements of the remaining trees were recorded in accordance with the method in practice at the Experiment Station.

Mr. Clapp arrived August 26 and remained until September 1. After reviewing the silvicultural and grazing projects in the vicinity of the Station he accompanied Cooperrider and Pearson on a two-day inspection trip of the Clarkdale smelter smoke area.

Preliminary preparations are being made for the annual meeting of the Southwestern Division of the American Association for the Advancement of Science to be held in Flagstaff next spring. The Experiment Station is being called upon to take an active part in the arrangements. If the date can be set late enough to insure favorable weather it is hoped to include several forest trips among the field excursions.

The most outstanding achievement in Forest Research in D-3 during the past three years has been the successful culmination of experiments in exterminating porcupines by Mr. E. E. Horn of the Biological Survey. During the past three years the Biological Survey has had from one to three men working intermittently on this problem at the Experiment Station. Two years ago poisoning appeared hopeless. Horn, however, has been working persistently on baits and methods of placing them, based on observations of the animal's habits. Salt and strychnine were found to be an effective bait, but for a long time difficulty was experienced in placing it where porcupines would be likely to find it. An important step in solving this problem was the discovery that the animals move back and forth between the lowlands and prominent mountain peaks along fairly definite routes of travel. These routes are made conspicuous by the fact that nearly every tree is damaged. Generous baiting in the path of migration, which is usually about a mile wide, will get nearly all the porcupines in the vicinity. Last spring Horn established a series of tree stations in one of these strips, placing an improvised wooden cup containing salt and strychnine in each marked tree. A recent examination revealed a dead "porky" under more than half of the baited trees and in one instance three carcasses were found under a single tree. The present outlook is very favorable for effective control of this pest at a reasonable cost.

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August Activities

During the early part of the month Roeser established 14 additional reproduction quadrats in the cut-over area within the Station forest. These were located so as to cover practically all degrees of thinning in Douglas fir and Engelmann spruce sapling stands, and also some south slope yellow pine cutting. Four of the quadrats were laid out in the original Douglas fir thinning and check plots of 1917. Valuable information has already been obtained locally regarding natural reproduction under various degrees of cutting in mature Douglas fir stands, but since a large area of the stand of this species is in sapling growth, information is desired as to the effect which opening the stand has on encouraging natural reseeding and the establishment of reproduction. Preliminary examination indicates that germination is higher in a stand thinned approximately to 7x7' than in a dense sapling stand, and what is more important, survival is considerably greater. Under a lightly thinned or unthinned stand of this class, new growth is pretty thoroughly choked out if it does get a start.

A new laborer was employed in the middle of the month to take the place of Rambo, who resigned. Quite a bit of Roeser's time was directed toward acquainting the new man with his duties, especially those relating to the T-1 (type study) observations. Considerable time was also put in on the erection of a new steel tower at Station F, to take the place of the old wooden structure at the base station. In between times progress was made toward cleaning up the two plots cut last year under our management plan.

Since the area systematically cut-over to date is located in a part of the Station area infrequently visited by the public, it was decided to make a slight change in 1927-1928 plans and establish a visual demonstration plot for the benefit of the general public. An acre opposite the improvement area in a north slope Engelmann spruce-Douglas fir stand was laid out, marked, tagged and measured, and desirable cutting and thinning practice will be featured.

Assistant Forester Clapp, District Forester Peck, and Mr. Bates visited the Station on the 24th and plans for work in the near future were outlined and discussed.

September Plans

The 1924 western yellow pine source of seed plantation will be tallied and the trees measured, and such other local

plantations which are due for reexamination will be visited. Cone counts will be made on the trees involved in the yellow pine and Douglas fir flower and cone production studies. This is a heavy seed year for yellow pine, and as much seed as possible will be collected, not only from the individual trees in the breeding study, but also from all Strain A trees which are bearing and there are several of them. It is believed a few cones will also be available from the controlled pollination experiments of 1926.

The first three plots cut over under our present management plan, initiated in 1922, will be remeasured this month for five-year growth performance. The data will provide a check on the old Mc-4 (Douglas fir) cutting experiment insofar as growth in mature stands is involved.

An attempt will be made to visit the thinning plots in sapling Douglas fir (Christmas tree) stands in Jarre Canyon, on the Pike Forest, at the close of the month, but the press of work to be cleaned up at the Station may make it necessary to postpone this work until October.

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MANUSCRIPTS RECEIVED

PACIFIC NORTHWEST

Growth of Douglas Fir in Western Oregon and Washington. R. E. McArdle. (Dept. Bul.)

IN PRINT

Frothingham, E. H.	Forestry possibilities in southern Appalachian hardwoods. (Proceedings of the Ninth Southern Forestry Congress.)
Korstian, C. F.	Factors controlling germination and early survival in oaks. (Bulletin 19, School of Forestry, Yale University, 1926.)
Wyman, Lenthall	Naval stores research. (Proceedings of the Ninth Southern Forestry Congress.)
Zon, Raphael	The problem of pulpwood supply in the Lake States. (Paper Trade Journal. Feb. 24, 1927) (Reprint)
" "	Reforestation - a practical method of flood control. (Floods, Forests, and the Future; American Tree Association.)

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OFFICE OF FOREST PRODUCTS - District 1

Sawmill Studies

All members of this Office, with the exception of Mr. Whitney, spent most of August on the final compilation of the major results of the District sawmill studies. The permanent force was augmented by the full-time assistance of two temporary computing clerks. Final tables will include (1) comparisons showing the effect of size upon the value of the product and the cost of production for sound logs and trees of five different species; (2) stand tables for white and western yellow pine to show the effect of cutting to different diameter limits on the return per acre; (3) defective log comparisons for five species showing the effect of size and defect upon the values and costs. This work has taken precedent and will be pushed to completion in the very near future.

Further work on the office compilation of data collected in the "Depreciation in Fire-Killed White Pine Timber" study has been discontinued until the above job is finished. Field work on the depreciation study was completed July 30.

Lumber Prices and Movement

Prices	Annual 1926	First Q. 1927	Second Q. 1927	July, 1927
Idaho White Pine	$37.77	$38.48	$38.41	$37.62
Pondosa Pine	26.33	26.28	26.72	25.21
D. Fir and Larch	17.78	17.62	18.92	18.47
White Fir	19.10	16.46	18.02	18.26
Spruce	23.73	23.77	24.09	22.81

	August, 1926.	August, 1927.
Cut	178,816 M	149,382 M
Shipments	175,484 M	126,091 M

Lodgepole Pine Utilization Study

Mr. C. N. Whitney of this Office spent the month of August in Districts 2 and 4 assembling and adding to the data already collected for the Utilization of Lodgepole Pine study. Several days each were spent in the Denver and Ogden offices and the remainder of the month among typical lodgepole pine stands and the wood-using

centers of these two Districts. Considerable attention was paid to getting first-hand knowledge of stand types, marking methods and the present degree of utilization practiced in logging. Several large tie sales were visited. Before going into Districts 2 and 4 Mr. Whitney spent two weeks at the Forest Products Laboratory on this work and interviewed representatives of the larger wood-using industries in New York and Chicago regarding present and future use of lodgepole pine products.

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OFFICE OF FOREST PRODUCTS, District Six

Columbia National Forest Fires

A succession of lightning storms over the big snag areas of the Columbia National Forest, on August 1, 2 and 3, followed by extremely bad fire weather, created one of the very worst forest fire situations that District 6 has ever experienced. From the start it was clear that the local forest organization could not possibly rise to the emergency, and all members of the District office who could be spared were called upon for help in the field - the very few men that continued at the office were held subject to call, in the meantime rounding up fire fighters by the hundreds.

Mr. Hodgson spent practically the entire month as general camp superintendent at the Lost Creek fire where 200 men were employed at six camps. Johnson and Gibbons assisted in the employment of fire fighters.

The fires, as suggested, not only demoralized the administrative routine of the District office, but also more or less the work of Products. This is the first time, so far as can be recalled, that it has been necessary for the Products personnel to assist on fire work.

General Woods Waste Survey in the Douglas Fir Region

Johnson and Spelman spent ten days in the field on the woods waste survey and the balance of the month in the office, utilizing the bulk of the latter time in working up the field data; the result is that the data so far collected this year in connection with this study have been worked up.

In last month's report reference was made to the white fir woods waste which is resulting in the logging operation of the George H. Chaney Timber Company, in the Coos Bay region or

near Coquille, Oregon. Mr. Johnson reports that since that time Mr. Chaney has sold a white fir raft containing 600,000 board feet to the Coos Bay Lumber Company of Marshfield for $4.50 per thousand, or at a price considerably below the logging cost. He also reports that the E. E. Johnson Lumber Company of Coquille had purchased some of these white fir logs, cutting them into 2x4 and 2x6 dimension and finding considerable difficulty in moving the product at $12.00 f.o.b. mill.

Proposed Felling and Bucking Study in the Douglas Fir Region

During the month, while held in the office because of forest fires, Mr. Spelman found it possible to give some thought to the felling and bucking study which it is planned to start toward the close of this year and which he will be in charge of.

Pulp from Mill Waste

If the reported plans of the Western Lumber and Pulp Company of Aberdeen, Washington, are carried through a further advance in the integration of the lumber manufacturing and paper pulp industries of Oregon and Washington will have been made. As it is, a good start has already been made. The Columbia River Paper Company gave the region its first combined sawmill and pulp operation under one ownership and management. A similar layout is now under construction at Astoria, Oregon, and the one at Aberdeen here referred to will make the third. This does not take into account several other pulp companies now in operation or under construction that are utilizing mill waste solely or partially purchased from adjoining or nearby sawmills.

Distillation of Oil from Port Orford Cedar

In the course of the field work on the general woods waste survey in the Coos Bay region, Mr. Spelman made a visit to the mill of the Western White Cedar Company near Marshfield, Oregon. He reports: "At this plant, in a separate building, a distillation plant on a semi-commercial scale was in use to extract the oil from Port Orford cedar. The distillation layout consists of four large vats built of wood, about 5 feet diameter and 10 feet high, which are filled by a chain conveyor with sawdust from the head saw of the mill. The sawdust is subjected to live steam from the mill up to a temperature of 160° C, and in the course of treatment a crude oil distillate is collected. The yield is about 5 gallons of oil to each vat of 230 cu. ft. of sawdust. The crude distillate is redistilled, yielding four products, as follows: (1) Borneol, (2) Cadinene, (3) Pinene, (4) Limonene.

"The largest market is for the Borneol which is being sent to France. Although not positively known, the chemist, Mr. G. A. Parr, believes that it is being used as a base for perfumes. From what could be learned the venture is in a more or less experimental stage; whether it can be worked out on a profitable commercial scale remains to be seen. The chief obstacle is the matter of good markets for the products. Samples of the crude distillate have been sent to the Laboratory at Madison, where an analysis was made."

Western Yew Staves

While at Coquille, Mr. Johnson visited the plant of the Coquille Wood Products Company which is engaged primarily in the production of yew staves for archery staves. The company uses only best-quality yew, straight-grained and containing 23 to 26 annual rings per inch. The logs are cut into bolts $2\frac{1}{2}$ and $3\frac{1}{2}$ feet long. The bolts are then quartered, each quarter with an inch or two removed constituting a stave. The staves are air-seasoned on racks under shelter for one year, six months with the bark on and six months with it off. After seasoning the staves are split into proper size for shaping into bows. The end of the stave toward the large end of the bolt is utilized for the splice at the center of the bow, with the result that the bow tips are more or less of similar material with practically the same resilience.

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RANGE RESEARCH

WASHINGTON

Forage Investigations

Routine Plant Work

Seven plant collections, representing 148 specimens, were submitted during the month to the Bureau of Plant Industry for formal determination. No specimens were returned during the month from that Bureau and no formal reports were made to the field. Thirty-five specimens were mounted.

Bulletins

The Glossary has been returned to Dayton by Chapline. It is being greatly enlarged to provide for recommendations made by the Board of Review, who evidently prefer a much fuller work than was originally contemplated. Conferences were resumed with Dr. Coville over the browse bulletin, he having returned to Washington. The artificial reseeding bulletin, after complete revision, is in Chapline's and Forsling's hands.

"Types" of Callisteris violacea and Gilia montezumae

As a result of queries from District 2 respecting the nomenclature of certain gilias from the Montezuma National Forest, Dayton was able to locate in the general collection of the U. S. National Herbarium the long-lost type of Callisteris (= Gilia) violacea Greene, from the Montezuma National Forest, the whereabouts and identity of which have been mysteries to botanical science for 13 years. This and another specimen stumbled across in this search have been added to the type herbarium of the U. S. Museum. These discoveries have also cleared up the status of specimen no. 40183 from the Montezuma and have resulted in two short papers which Dayton has submitted for publication in the Bulletin of the Torrey Botanical Club.

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GREAT BASIN EXPERIMENT STATION

General

Field work during August was confined to the various projects located in the vicinity of the general headquarters of the Station. Special emphasis was placed on quadrat and major plot mapping in the

natural revegetation projects and gathering plant development data in the study of the relation of climate to plant growth. The season of 1927 has been almost ideal from the standpoint of quality and quantity production of forage. Rainfall was approximately double the average amount during June, approximately normal in July, and a little below average in August. Under these conditions forage growth was rapid during June and July, and tapered off with a certain amount of "curing" during August. This has given the feed better fattening qualities than when growth continues through August. Livestock are fattening rapidly and sheep growers are of the opinion that lambs will be 5 to 8 pounds heavier than average this fall.

Two storms of unusually intensive rainfall occurred during the latter part of July, which yielded some striking results with respect to the effect of herbaceous vegetation on erosion and surface run-off in the watershed study. The vegetation on one of the watersheds now covers 45 to 50% of the surface, as compared to a 16% cover prior to 1919. The July storms indicate that this increase in cover has reduced surface run-off from summer rainstorms by about 69 per cent, and the amount of erosion or sediment removed by about 59 per cent.

The Uintah Basin Industrial Convention

Forsling spent the 3rd, 4th and 5th of August attending the seventh annual Uintah Basin Industrial Convention at Ft. Duchesne, Utah. This is a meeting held each year for the purpose of informing the people of northeastern Utah of the resources of the territory and the means of developing and using them to the best advantage. Approximately 14,000 people attended this year. Lecture courses were given on livestock, field crops and range problems, the latter being handled by Director Forsling. The subjects discussed were "Our spring, fall and winter range problems" and "How shall we manage our public domain." From 25 to 100 stockmen and farmers attended the two daily lectures. The listeners showed a great deal of interest in the problems, particularly with regard to how these ranges could be managed to improve their productivity and to contribute to more stable and more profitable livestock production. Resolutions were adopted in the executive session on the last day recommending that the open public domain be placed under federal control and that range research be extended to more adequately study the problems on winter, spring-fall, and summer ranges.

Field Day

The third biennial field day was held at the Station on August 16 and 17. Over two hundred visitors were in attendance part or all of the time. There were present representatives of

the woolgrowers, cattle raisers, and farmers from all over the State, including the president of the two State livestock associations and the president of the State farm bureau. There was in attendance, also, members of several water users associations of the State, the Extension Service of Utah and Nevada, members of the Forest Service from Districts 1, 2 and 4, and officials of the U. S. Bureaus of Animal Industry and Biological Survey. There were 47 automobiles in the caravan that traveled up and down the mountain to see the results of the Station work.

Emphasis was placed on natural revegetation, artificial reseeding, and the effect of grazing on watershed protection. The possibilities of range improvement under management were shown by two areas of range, both of which had been very badly depleted prior to 15 years ago. One of them, due to faulty management and depleted soil, had improved but slightly up to the present time, and more than 7 acres are now required to support a cow one month. The other area where the soil had not been badly depleted, where some good forage plants were present to provide seed, and where special care had been taken to improve the range had improved until now only 2.4 acres are required to graze one cow one month.

A campfire meeting held on the evening of the 16th was devoted to a discussion of the use of research in solving range problems and the value of better range management as a means toward more profitable range livestock production.

Most of the morning of the 17th was taken by the visitors for a discussion of the open public domain range problem. Before the close of the meeting three resolutions were adopted. One recommending federal control of the public domain, and another urged the continuation and extension of range research work.

This was by far the most successful field day that has yet been held at this Station. The stockmen were keenly interested in the experimental work, and it is believed they carried away many ideas of what has been accomplished. It was perhaps the first time that the open public domain range has been considered immediately after careful inspection of what can be accomplished under proper control and management.

The Public Domain

Utah stockmen are giving more thoughtful consideration to the control of the open public domain than at any time heretofore. As an outgrowth of the Uintah Basin and Great Basin Station meetings a third meeting was called at Salt Lake City on August 30 to consider the points that should be provided for in any system of

control of this class of range. Thirteen main points that should be covered in legislation were tentatively outlined. These included restoration of the range to highest economical production, watershed protection, and due consideration for wild life and recreational interests. These are to be given wide publicity in order that the public may have an opportunity to study them prior to another meeting to be held in October. Representatives from all interests in each county of the State will be invited to attend the October gathering. The livestock and other interests hope a definite program may be adopted that will result in favorable action by Congress.

Forest School to be Established at the Utah Agriculture College

Director Forsling, together with District Forester R. H. Rutledge, Dana Parkinson and L. F. Watts of D-4, attended a conference on August 27 with the President, Director of Experiment Station and Extension and the Dean of Agriculture of the Utah Agricultural College to consider the establishment of a Department of Forestry in that institution. The fact that 95 per cent of the area of the State of Utah will always be valuable chiefly for the native products of the soil, i.e., water, forage, timber, and wild life; that more enlightenment on the part of the citizens of the State is needed for the handling of these resources, and that there is a considerable demand for properly trained people to handle them, has led the College officials to believe that the necessary courses should be included in the college curriculum. The establishment of a department to cover these subjects has now been approved by the President and Board of Regents of the College, and it is expected that students will be permitted to register for the courses this fall. The complete faculty for the department has not yet been selected.

The courses will cover straight forestry as well as range management, and will be made sufficiently strong to make possible the procurement of degrees in both branches.

Training Assignees

The Station is becoming somewhat of a school itself. The second group of men assigned to the Station for a month's training period have just left the Station. They include Fred Stell, Technical Assistant, Montezuma Forest, and A. G. Nord, Supervisor of the Ashley Forest. O. J. Murie, Associate Biologist of the Bureau of Biological Survey, who has been detailed to make a comprehensive study of the elk problem in the Jackson Hole country, arrived at the Station on August 26 to remain for a period of approximately a month for the purpose of acquiring such information as he can that will be of value in the elk range studies. This makes seven training assignments so far this year, and two additional men are expected for September.

Cooperative Studies on the Internal Characteristics of Plants

Dr. J. Arthur Harris, Head of the Botany Department of the University of Minnesota, with whom the Great Basin Station is cooperating in the study of osmotic concentration and other properties of the cell sap of range plants, spent a few days at the Station early in August. This visit was in connection with starting two of his men, William Martin and John Moore, both graduate students of the University of Minnesota, on field work. This is the fourth season that Dr. Harris has carried on work at this Station.

Motion Pictures of Range Research Work

Raymond Evans, Director of Motion Pictures, and George Goergens, Chief Cinema Photographer of the Department of Agriculture, spent August 23 at the Station shooting scenes for use in a range management picture that they have been developing in D-4 this summer. The plans for making the pictures had already been worked out and they spent a very busy day taking a total of thirty-three scenes. This is the first time that an attempt has been made to use this means of showing the results of the Station work. It is believed that the pictures will be effective in portraying the fact that range management is being built on a research foundation as well as showing some of the outstanding results.

Visitors

Among the more interesting visitors at the Station during the month of August were Dr. R. R. Staples and Dr. A. E. Romyn, both of the Department of Agriculture, Union of South Africa, who are touring the United States this summer. Dr. Staples is in charge of range investigations at the government agricultural experiment station at Cedara, Natal, South Africa, and Dr. Romyn is in charge of animal husbandry work. The range work now being handled by Dr. Staples was started about five years ago. It is interesting to note that this is probably the first place that research work was undertaken on native range or pasture lands outside of the United States. Range work has been started this year also in Canada at the Dominion Experimental Farm at Swift Current, Sask. Although extensive work on the management of improved pasture lands has been done in various countries, including Great Britain, Australia, New Zealand and other places, that now being done in the United States, South Africa and Canada, probably comprises the only countries where the problems of native range forage are being studied.

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JORNADA RANGE RESERVE

Range Conditions and Precipitation

The range shows a vast improvement over last month. Most of the perennial grasses are in flower and have made an excellent volume growth since July 25, the beginning of the growing season.

The precipitation varies from 1.5 to 3 inches and has been well distributed throughout the month. All the tanks on the Mesa are filled with water.

Investigative Work

Five quarter-acre enclosures have been constructed this month and a number of new quadrats established.

The black grama and the tobosa clipping study areas were clipped for the first time this season on the second of the month. Since then the volume produced by each quadrat has been above the average for last season.

The charting season was officially opened on the twentieth.

Condition of Stock

All stock is in good condition. Five hundred seventy-three calves have been branded to date, of which about 60% were steers. The indications are that there will be a good calf crop as there are still a large number of young unbranded calves in the pastures.

The Jornada Breeding Herd was augmented by the addition of two hundred and eleven cows and ten bulls on the 15th of the month. These cows were purchased from the "B Bar" ranch in the vicinity of Van Horn, Texas. The purchase price was fifty dollars for cows with calf at side.

Visitors

Professor Lantow of the New Mexico A. & M. College has been on the Jornada several times recently, negotiating the purchase of a number of heifer calves from the Jornada herd to be added to the herd on the College Experimental Ranch.

Personnel

Mr. Frank Brown of Las Cruces joined the Jornada force on the first of the month as Temporary Field Assistant.

Director Schoeller is expecting to return from Washington soon after September 1.

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SANTA RITA RANGE RESERVE

Handling Stock

Stock are in excellent condition and some sales of calves have been made during the month with additional sales of both cows and calves contemplated during September. Parker has two carloads of seven months-old calves rounded up and expects to realize $30 per head on the lot in the very near future.

Precipitation and Growth

Rainfall has been extremely spotted and largely in the character of showers, with the exception of the last days of the month when a good general rain covered the entire Reserve. Growth started generally early in July, then dried up and did not start again until the first of August. An ample supply of forage is now assured for the entire Reserve. Messrs Turner and Riggs recently spent a day on the east side of the divide, in the vicinity of Gardener ranch, and report an unusually favorable growth of forage everywhere. The southern part of the State, in the vicinity of Empire, Patagonia, Nogales, and Arivaca appears very much like irrigated fields, the growth is so good. Farther north in the vicinity of Florence, Superior, Miami and Globe, conditions are reported below normal up to the most recent rains.

Period Studies

Recent observations at Mesa Station have furnished some interesting data in regard to protected vs. adjacent overgrazed range. Under protection (since July 1925) Rothrock grama has made 30% better height growth than overgrazed range adjacent. In addition to this there are five to six times as many flower stalks under protection as on the overgrazed area. Density appears slightly greater on the inside, though definite information is lacking pending the charting of quadrats.

Poisonous Plants

Recent listings of 2 of the Isocoma (Aplopappus) plots present some interesting data. The plots are 50 feet square, one of them having been light burned during the past spring and the other left in its natural state. The tabulation of results follows:

Species	Light burned in spring				Natural conditions			
	Live plants		Dead plants		Live plants		Dead plants	
	old	seedlings	old	seedlings	old	sdlngs	old	sdlngs
Isocoma	3	0	240	Impossible to count but all dead.	102	1586	7	0

Note #.

Impossible to count dead seedlings on either plot.

This shows a total of 3 live Isocoma plants on the entire burned-over plot and it appears doubtful if these will live to another season. On the unburned plot the number of new seedlings is unbelievable and nearly all have come in since July, 1926. Only 7 dead plants on the unburned plot indicates a very slow mortality from natural causes. Further study of the plots will prove interesting as a means of determining the number of seedlings that survive. No conclusions have been drawn from the study pending listing of all the Isocoma plots. However, it is interesting to note that the above plots are on range which has received summer protection for the past 3 years (1925-7) and light to full conservative use on a year-long basis. Grasses on both areas show exceptionally good growth, though that of the burned area is approximately 10 to 15 per cent below that of the unburned area in height growth and number of flower stocks produced.

Visitors

Visitors at the Station during the month were Prof. V. E. Shelford, from the University of Illinois, and F. G. Holdaway, Entomologist from Melbourne, Australia.

Dr. Taylor and Prof. McGinnes spent several days on the Reserve charting quadrats. At the same time cooperative project plans were discussed.

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Ingram's absence in the field necessitated omission of statements for the past two months. He spent the early part of June on the vegetative recheck work on the project, "Grazing Management of Douglas fir Cut-over Areas," on the Columbia. Spring check of coniferous reproduction on the Mr. Camp 9 transect was made by the N.W. Experiment Station.

Among the interesting things noted in plant succession on the transect this year is the heavy decline in density of fireweed over last year with a corresponding increase in grass cover, particularly where the sheep were bedded. How much grazing is responsible for this cannot be determined until the data has been analyzed.

A rotation of camps to prevent the excessive use sustained by the study area in 1926 was initiated in 1927. To date the major difficulties experienced by the sheepmen have been in losses by bear, the sheep otherwise doing well.

In Grazing Inspector Hill's inspection of grazing conditions in D-6 in June and July, the Range research work on the Crater, Wenatchee, and Columbia was studied. Mr. Hill gave us many helpful suggestions for the conduct of this work, and he was particularly interested in the Columbia project.

Dr. Hitchcock Visits D-6

The last half of July and first half of August were spent with Dr. Hitchcock, Senior Systematic Agrostologist of the Bureau of Plant Industry, on the Cascade, Deschutes, Umpqua, and Siskiyou Forests. Dr. Hitchcock is making a field study of alpine grasses with a view to determining the relationship of certain groups before completing his manuscript, "Grasses of the U.S.," which it is hoped will shortly be published.

An itinerary was arranged which would permit Dr. Hitchcock to reach particular areas which he desired to visit and at the same time permit inspection and assistance on minor studies work on the Forests named.

In discussions with Dr. Hitchcock the difficulties of the layman in identifying the grasses were frequently mentioned.

It will be of interest in connection with Director Forsling's note in an early issue of the Research monthly on the similarity of Bromus marginatus, B. polyanthus, and B. carinatus un- G. B. Exp. Sta. conditions, that Doctor Hitchcock himself admits

having difficulty in separating these species, and states that they may have to be listed as one species. Several other genera, Agrostis and Melica particularly, appear to be in much the same fix.

It has been with the idea of clearing up some of these doubtful questions of nomenclature that Dr. Hitchcock is making a field study. His forthcoming bulletin, which he states will briefly discuss these moot points, should accordingly be of very great interest and value to members of the Forest Service, particularly to grazing men.

Dr. Hitchcock expressed considerable interest in our grazing research work. He was able through our efforts to meet Prof. Peck of Willamette University, Prof. Lawrence, and Dr. Gilkey of O. A. C., and Drs. Sweetser and Henderson of the University of Oregon. Before leaving the District he hopes to visit Mt. St. Helens, Mt. Adams, and Mt. Jefferson.

Value of Lamb Gains on Cut-over Land

The crux of the problem of grazing use of Douglas fir cut-over lands - other than its effect on reforestation - is the value or profit in such use to be derived by the owner of the lands.

On the experimental area on the Columbia Forest in 1926, an average gain of 19.77 pounds per lamb was made during the season of 79 days. This gain was made on 1880 acres on which 1000 ewes and 1090 lambs grazed. Making liberal allowance for losses, cripples and cutback (a total of 90 head or 4.2%) on the basis of the remaining 1000 lambs, the gain made per acre was 10.51 pounds. This sold at the contract price of 11¢ per pound = $1.16 - the gross value of the lamb product produced per acre (or, 19.77 pound gain per lamb = 19770 total pounds of gain produced on 1880 acres = 10.51 pounds of gain per acre @ 11¢ per pound = $1.16, viz, the value of lamb product produced per acre). 19.77 lbs. gain per lamb @ 11c per pound = $2.17 per lamb gain on the acreage requirement for ewe with lamb of 1.88 (surface) acres per season (of 79 days) = .0238 acres per day or .714 acres per month, or a gross return per head per month of 82.2¢.

Of the total monetary gain for the band made on National Forest range in this experiment ($2316.60 or 1000 lambs total average gain = 21.06 lbs. @ 11¢ per lb.) 2180.80 was made entirely on cut-over land.

Comparable figures for high range are not available as yet.

The use of plots in demonstrating what Research is doing is well exemplified in the action taken by Ranger McFarland on the Oakridge District of the Cascade.

As part of the Forest Protection Week activities last spring, the entire personnel of the Oakridge High School, including teachers and scholars, were invited to visit the Dead Mt. area - an old burn where a series of plots covering range as well as forest management subjects have been established.

As each series of plots was visited, Ranger McFarland explained the purpose of the experiment, pointing out on the grazing plots some of the more obvious features of plant succession under protection and grazing use. Considerable interest was shown and a request made for a repetition of these instructive trips at some future date.

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